MRSA

What's new

Dr Ian Bowler

MRSA

- Background
- Politics
- Philosophy
- Economics

Background

- Staphylococcus aureus

- Methicillin=Flucloxacillin

Flucloxacillin sensitive — MSSA

Flucloxacillin resistant — MRSA

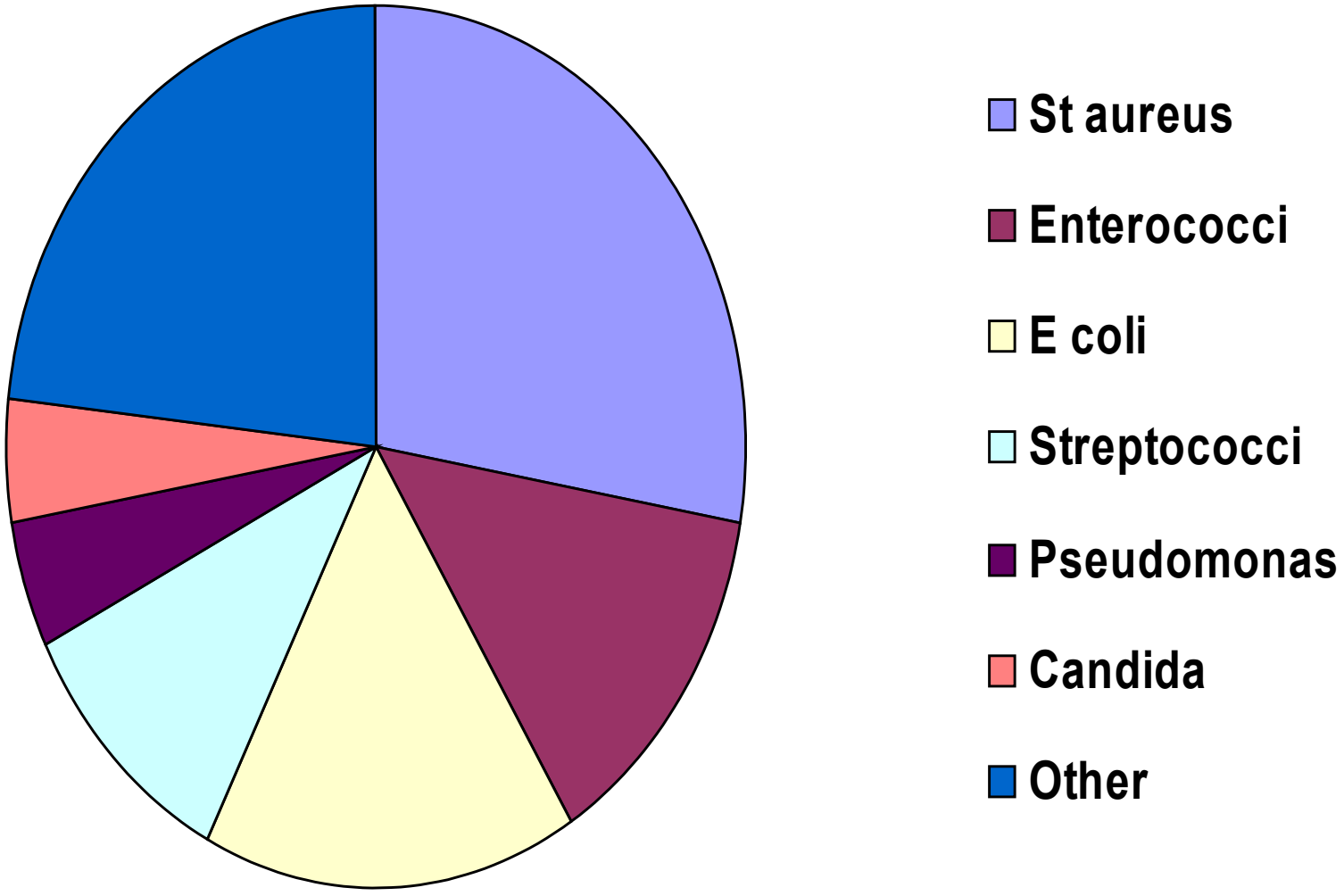
- Impact
  - Stapylococcus aureus
  - Methicillin resistance

Impact of Staph aureus

GP	Hospital
Respiratory	UTI
UTI	Wound*
Skin*	Respiratory*
Gastroenteritis	IV related bacteraemia*
	C difficile

Staph aureus: 20 % of hospital acquired infection

ORH All Bacteraemia



Impact of antibiotic resistance

MSSA

- ß lactamase — penicillin

MRSA

- Altered target — flucloxacillin
  cephalosporins
  meropenem, tazocin

- MRSA usually resistant to
  - ciprofloxacin
  - erythromycin
- Usually active
  - gentamicin
  - tetracycline
  - fucidic acid/rifampicin
- Always active
  - Vancomycin

MRSA: special features

- Spread in hospital
  - sick patients
    - are touched - hands
    - invasive disease common
  - high antibiotic use

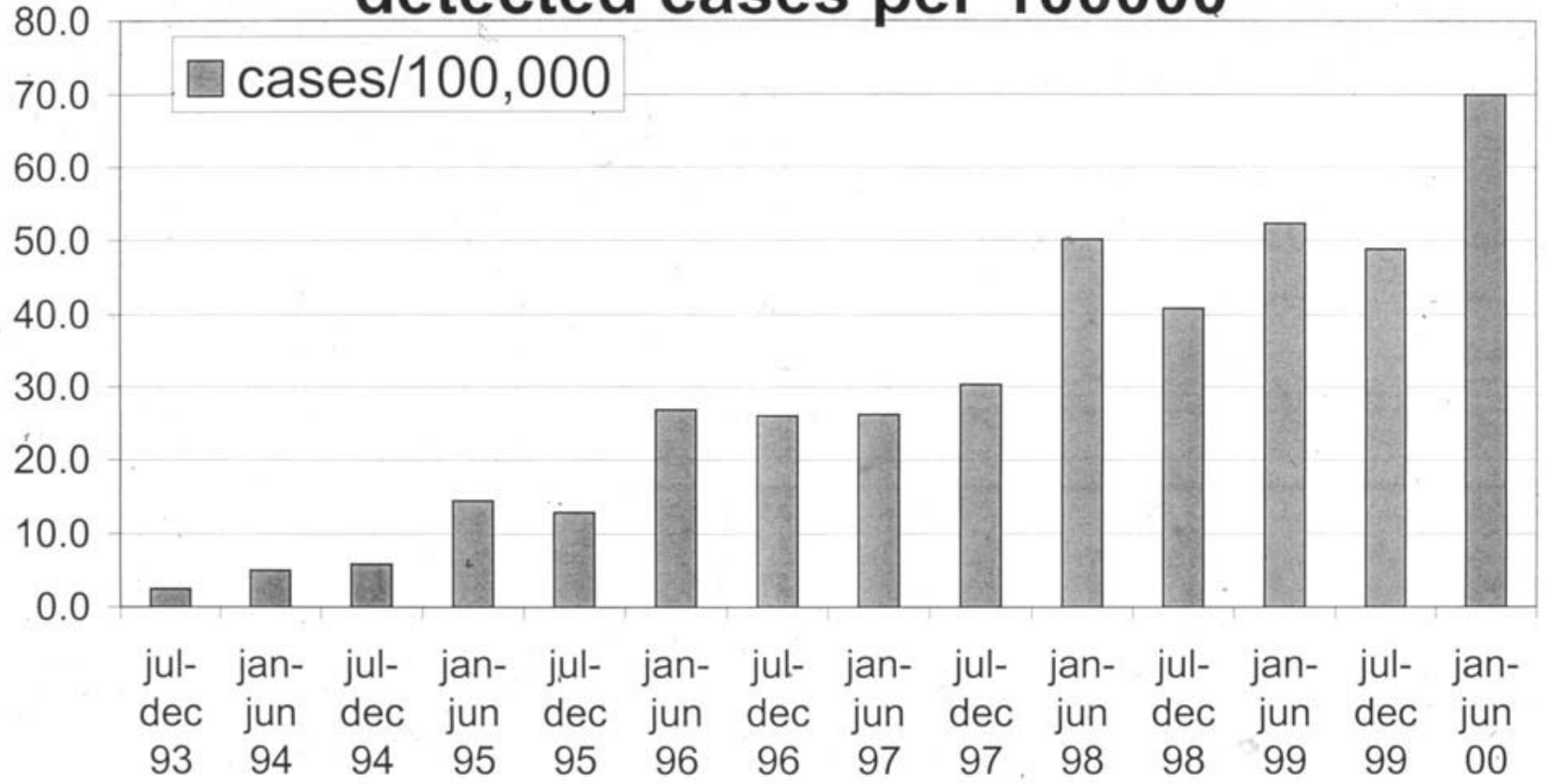
MRSA: special features

- Little community acquired disease
  - transmission uncommon
  - attack rate low

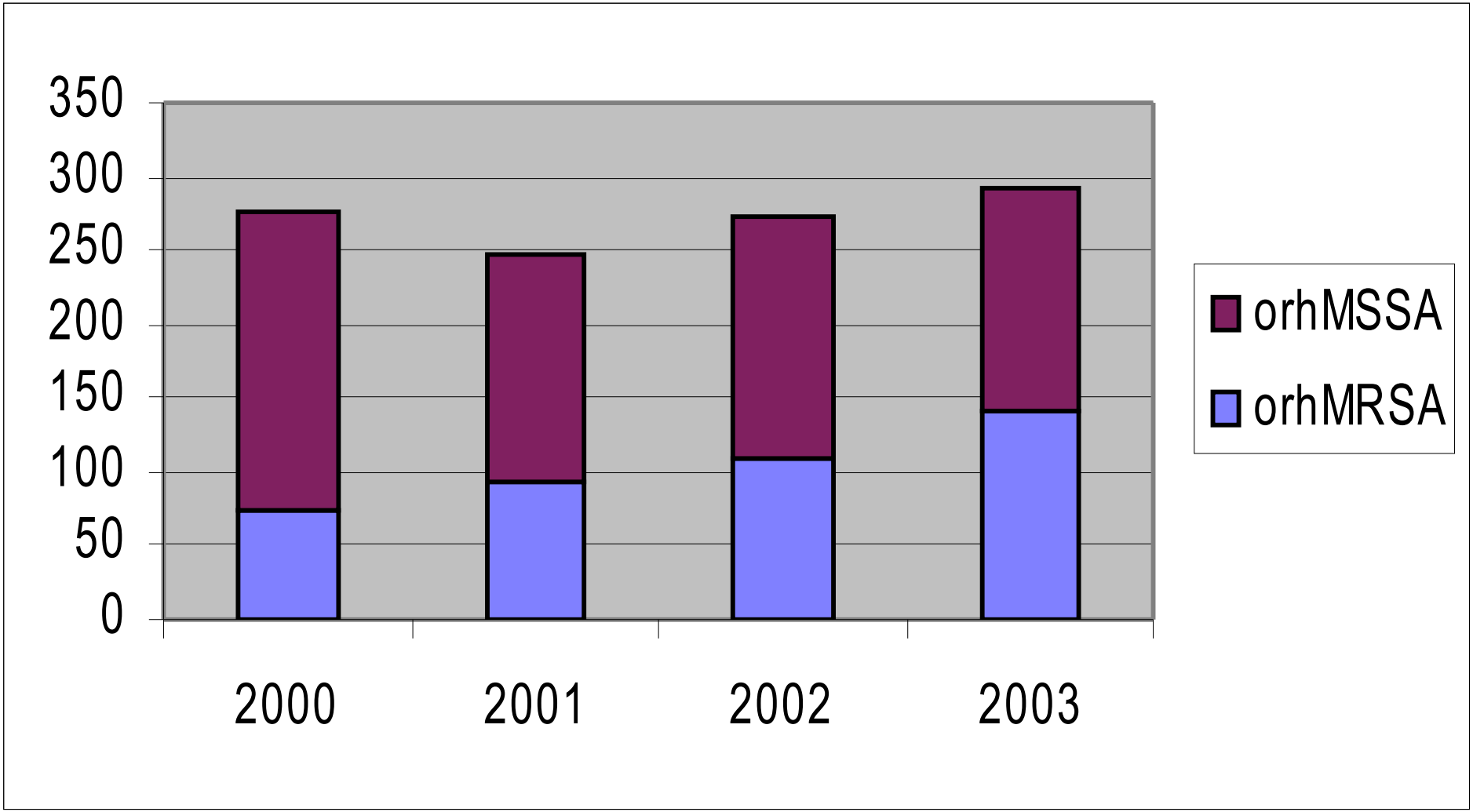
  Contact with hospitals

- Impact on antibiotic use/cost in hospitals

MRSA in Oxon residents, newly detected cases per 100000

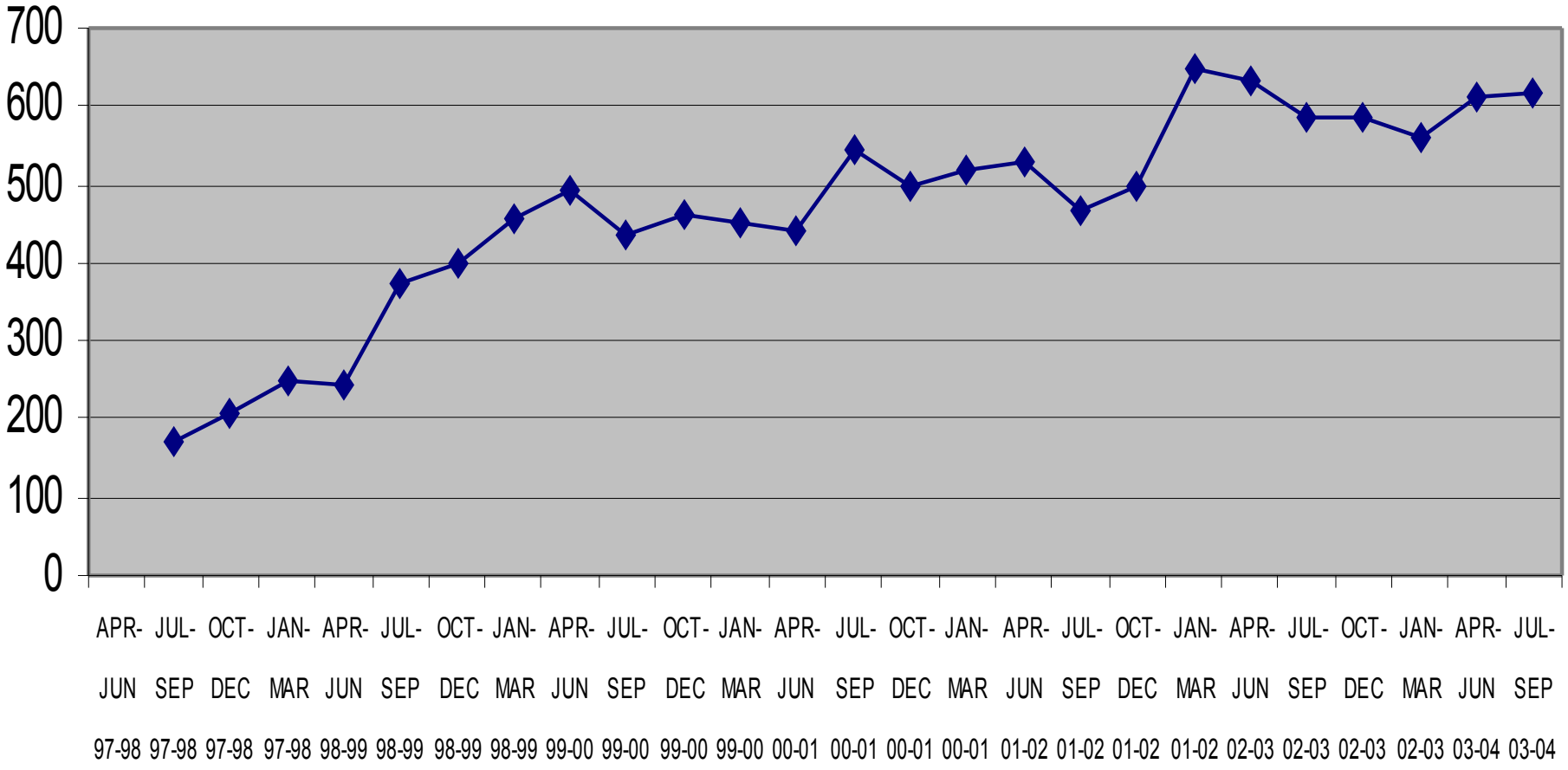


Staph aureus bacteraemia



- Prophylaxis
  - Wound — Cefuroxime
    Flucloxacillin/Gentamicin
- Treatment
  - Respiratory — Amoxy/Cefurox/Mero/Tazo
  - Wound — Fluclox/Cufuroxime
  - Sepsis — Cefuroxime/Mero/Tazo

Vancomycin Use: 1g vials



Impact on antibiotic use/cost

- Financial cost
  - MSSA bacteraemia £ 6k
  - MRSA bacteraemia £ 12k
- Ecological cost

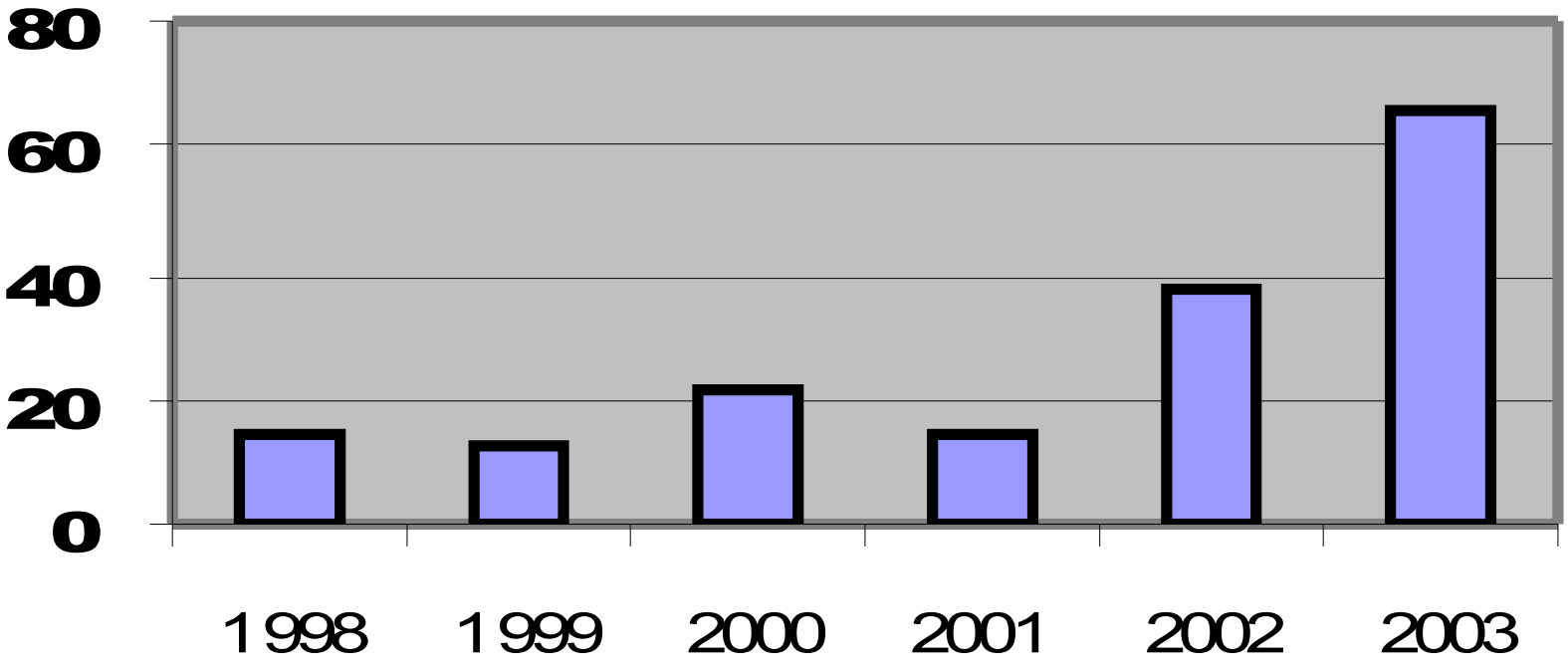
Cost of Staph aureus bacteraemia 2000-4

- 1328 Episodes £11.1 million

- 528 MRSA £6.3 million
- 800 MSSA £4.8 million

Excess cost due to MRSA £3.1 million

Patients with Vancomycin Resistant Enterococci



Background - summary

- Staph aureus - important cause of HAI
- MRSA spreads in hospital
  - increasing costs
  - creating niches for more difficult organisms
- Impact in the community is limited

Politics

HOSPITAL SUPERBUG KILLS BABY

A NINE-DAY-OLD baby has died from the super-

EXCLUSIVE

all their questions. The couple also want NHS staff to be given clearer guidance on how to fight the deadly

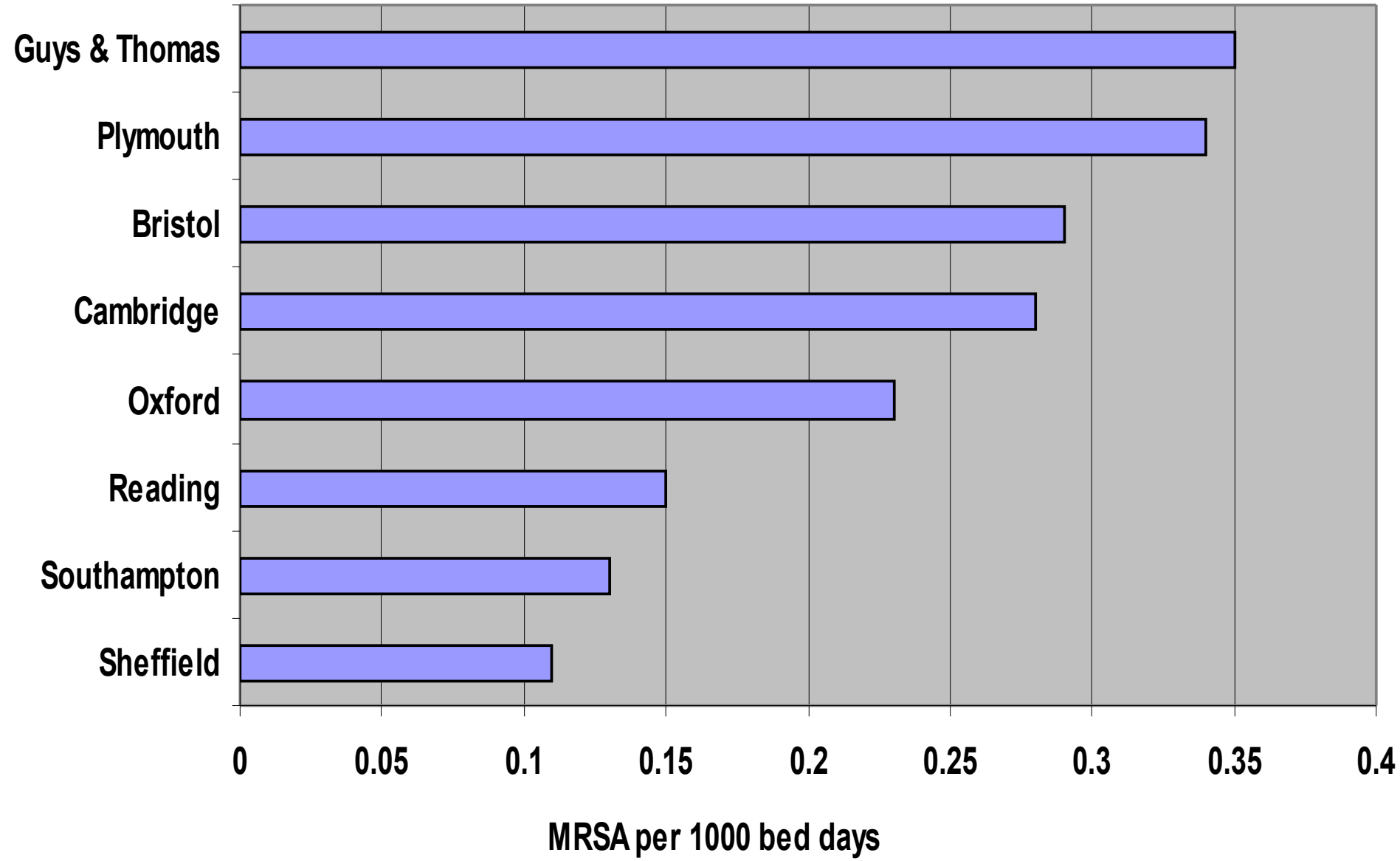
Politics

- Target - MRSA bacteraemia in acute Trusts
- 60% reduction by 2008
- Performance monitored by TVHA
- Feeds into ‘Star Rating’

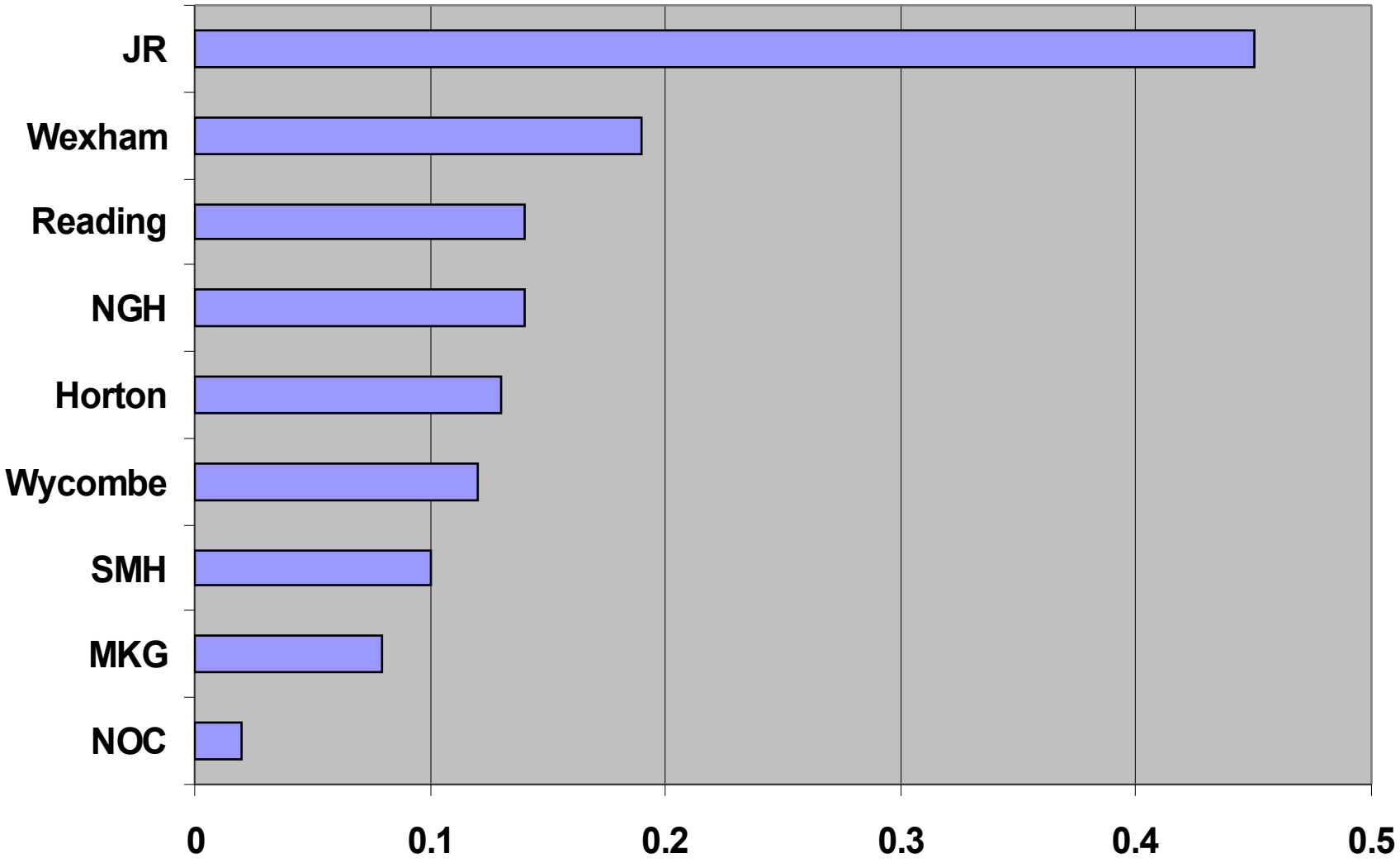
MRSA bacteraemia: a quality indicator?

- Nearly all hospital acquired
- A measure of cross infection
- Expensive
- Inconvenient for patient
- Public concern

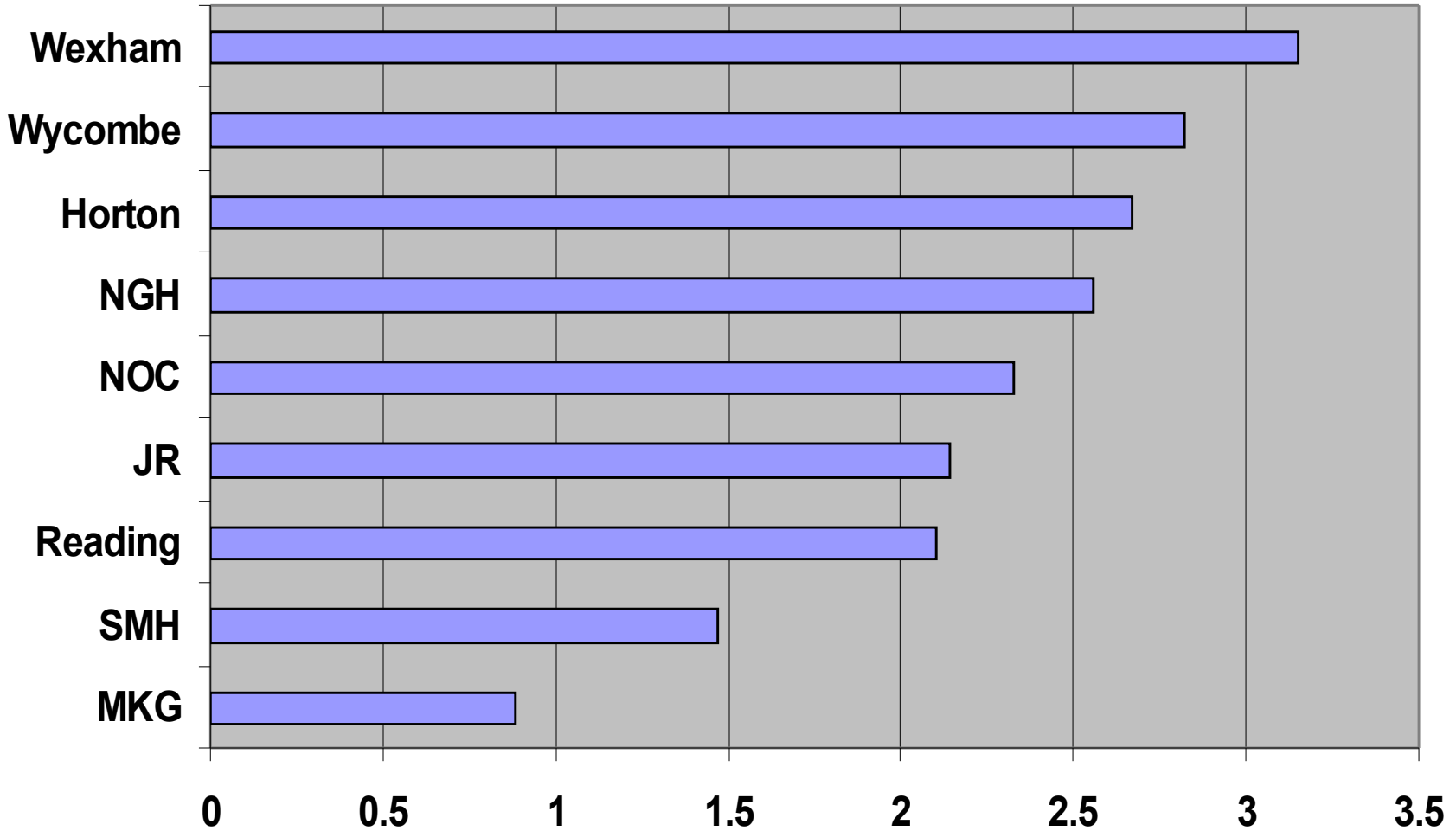
MRSA bacteraemia rate: April - Sept 2001



MRSA bacteraemia per 1000 bed days



MRSA bacteraemia % positive blood culture



Philosophy

- Organism
  - genome sequence - Hiramatsu - Japan
  - evolution of mecA - Enright - Oxford
- Virulence factors vary
- mecA inserts at low frequency
  - PV toxin positive strains in France and USA
  - EMRSA 15 & 16 in UK successful clones

Philosophy

- Why MRSA might appear more virulent
  - Colonises poor host - high attack rates
  - Empirical antibiotics inappropriate
  - Appropriate antibiotics may not be so good

Philosophy

- Host parasite interactions
  - Dutch Staph aureus study
  - Staph carriers at greater risk of infection
  - Non carriers who become colonised are at even greater risk
  - Is is bad to get a new strain of Staph aureus in hospital

Economics

- Is control feasible?
  - Incidence of colonisation and infection can be reduced
    - Endemic
    - High risk units
    - Hospital wide

Economics

- Can we afford it?
  - 3 Cost benefit studies
    - Endemic
    - Acute care settings
    - USA and Europe

Economics

- Prevent acquisition
- Prevent invasion

- Staph aureus
- MRSA specific

Preventing acquisition

- Hand decontamination
- Antibiotic use
- Screening and isolation
- Clean hospital?


Alcohol Gel

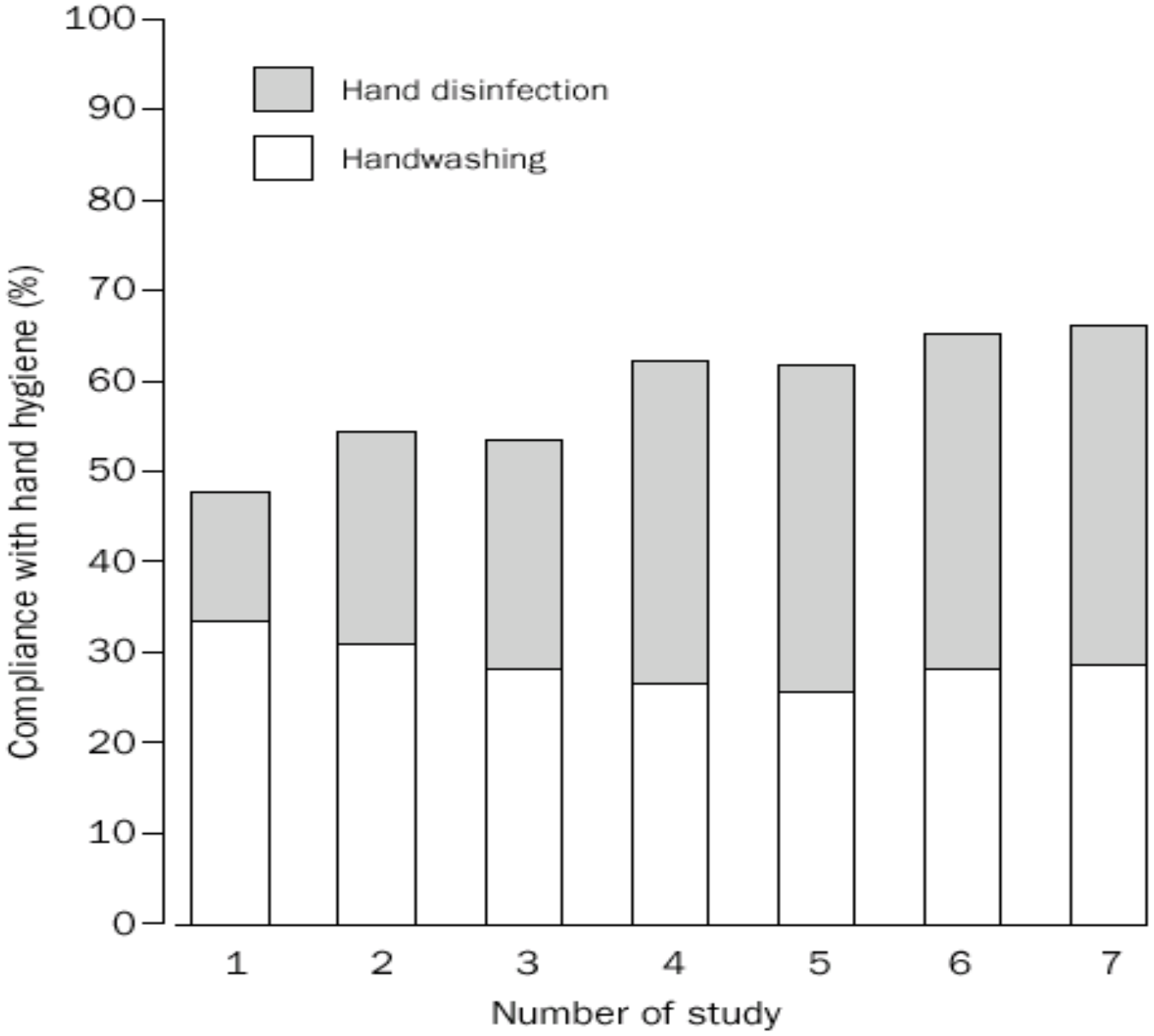
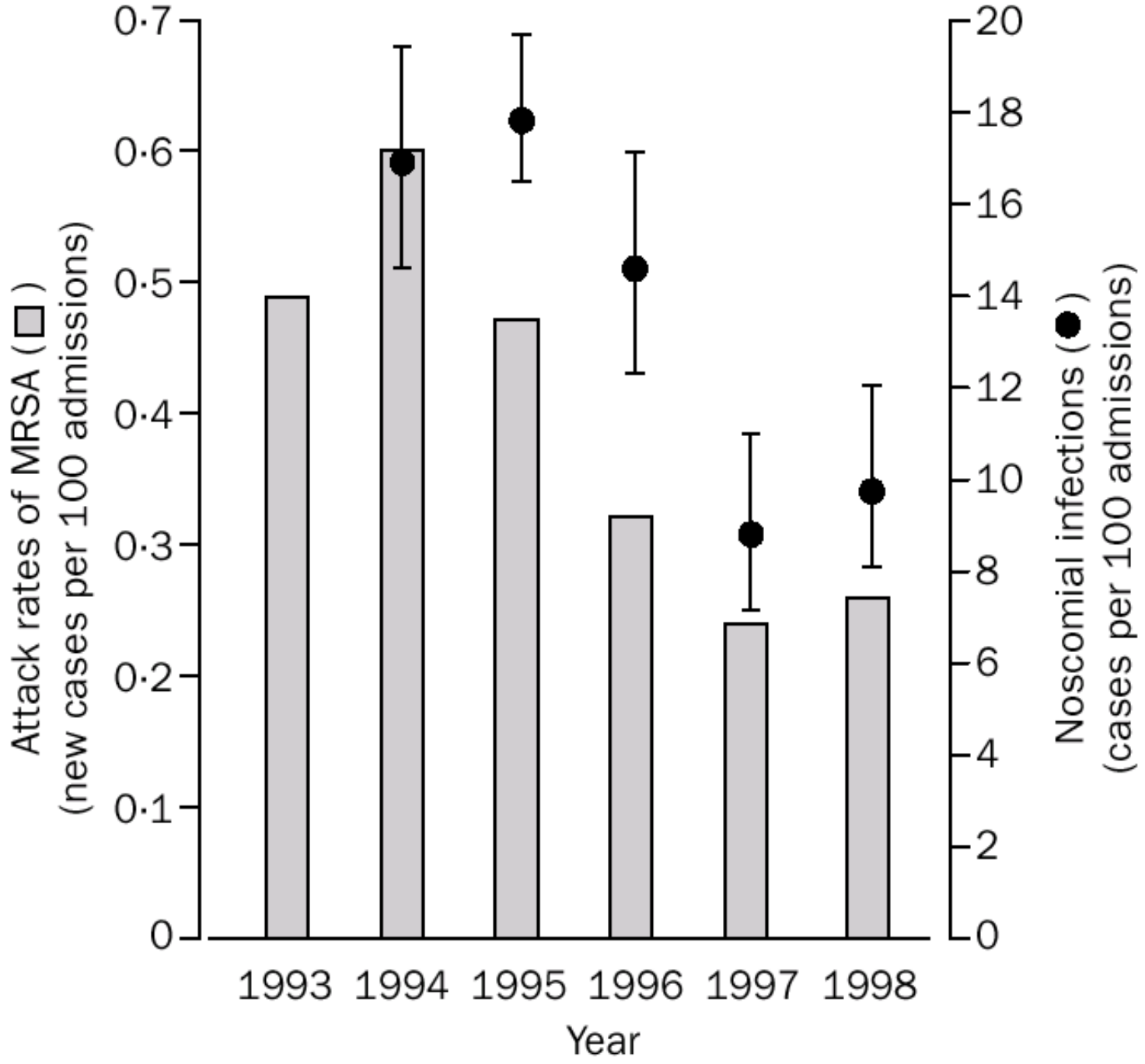


Figure 1: **Hand-hygiene compliance trend during seven consecutive hospital-wide surveys, University of Geneva Hospitals, 1994–97**


0·7
0·6
0·5
0·4
0·3
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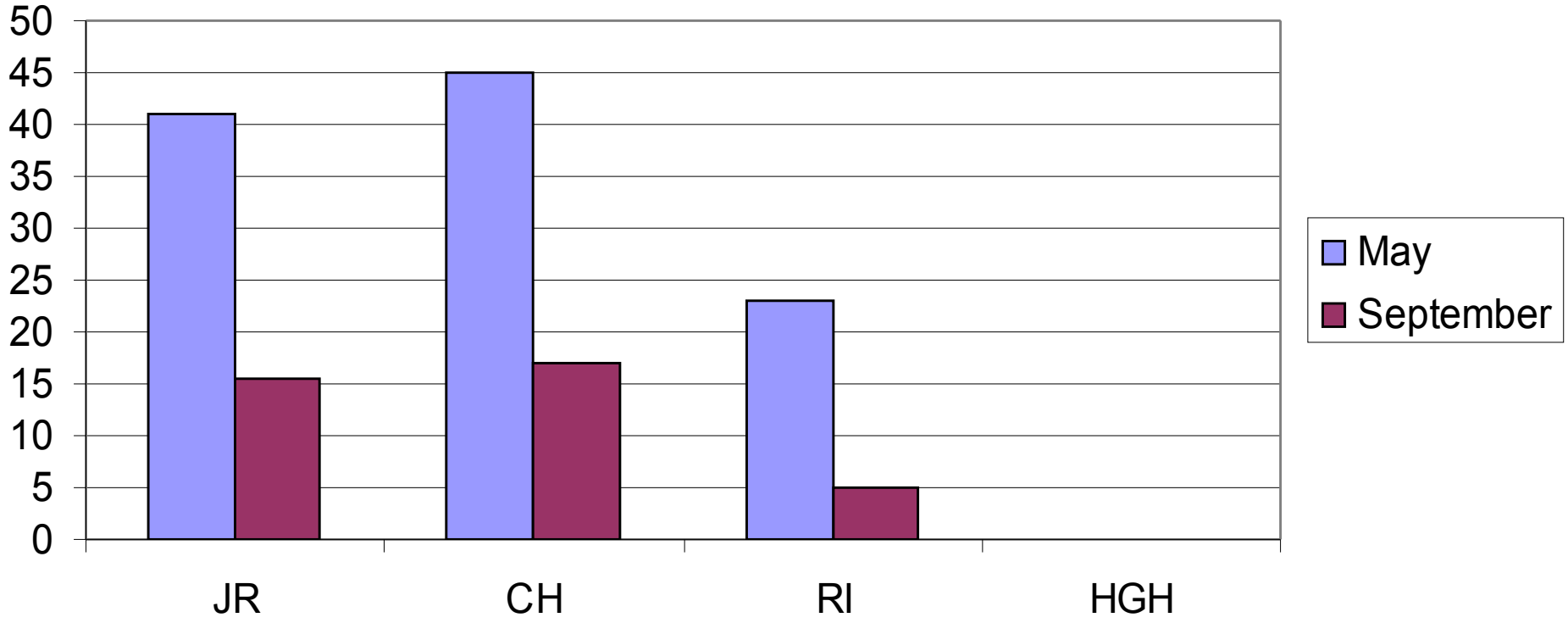
0
Attack rates of MRSA (□)
(new cases per 100 admissions)
20
18
16
14
12
10
8
6
4
2
0
Noscomial infections (●)
(cases per 100 admissions)
1993
1994
1995
1996
1997
1998
Year

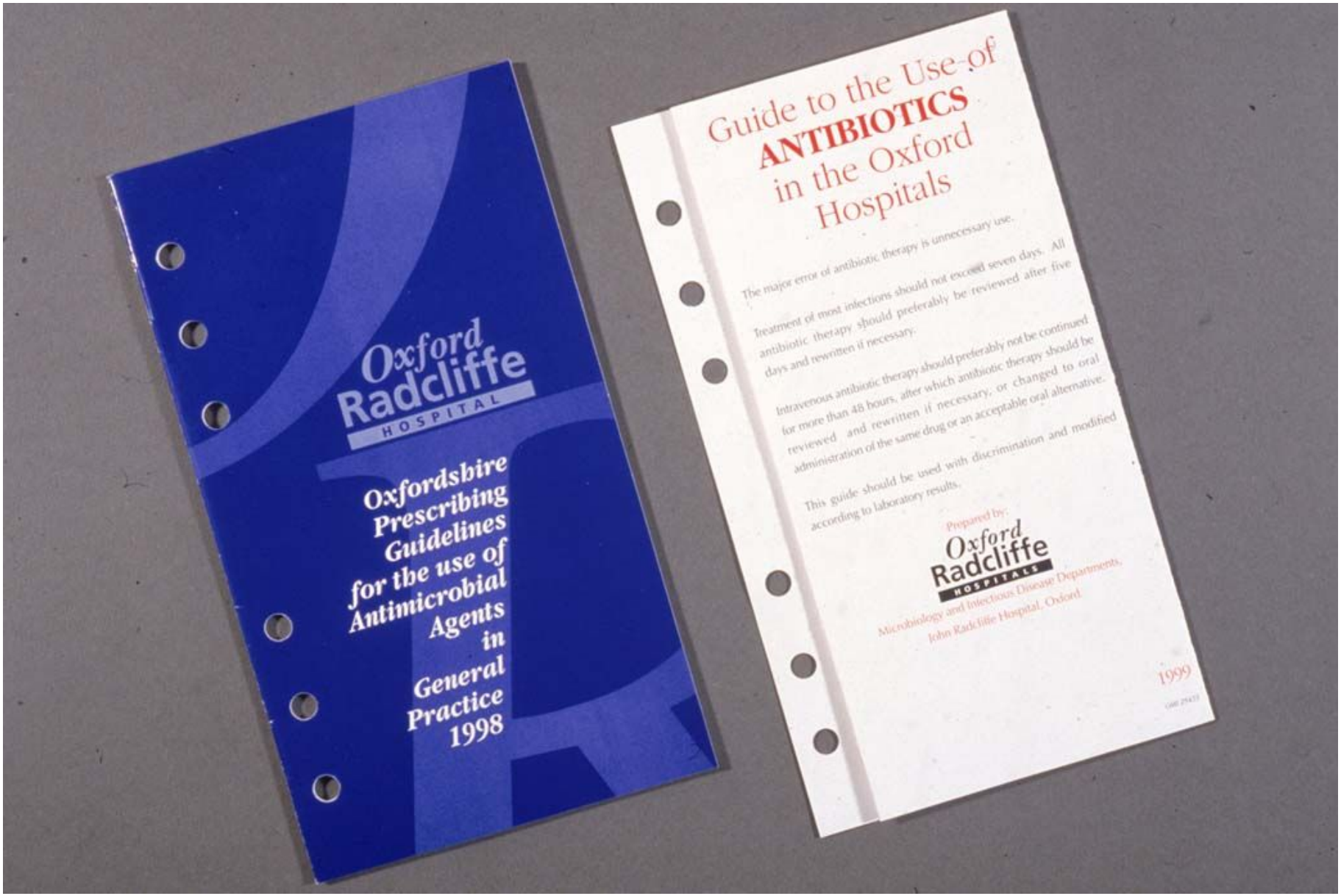

HANDY HYGIENE CAMPAIGN

Handy Hygiene campaign 2001

- Better quality paper towel
  - Saved £ 98,000
- Alcohol rub at every bedside
  - wall dispensers empty
  - new products November 2004
- Staff education
- Patient education

% Wall alcohol dispensers empty or broken
ORH 2002




Oxford Radcliffe HOSPITAL
Oxfordshire Prescribing Guidelines for the use of Antimicrobial Agents in General Practice 1998
Guide to the Use of ANTIBIOTICS in the Oxford Hospitals
The major error of antibiotic therapy is unnecessary use.
Treatment of most infections should not exceed seven days. All antibiotic therapy should preferably be reviewed after five days and rewritten if necessary.
Intravenous antibiotic therapy should preferably not be continued for more than 48 hours, after which antibiotic therapy should be reviewed and rewritten if necessary, or changed to oral administration of the same drug or an acceptable oral alternative.
This guide should be used with discrimination and modified according to laboratory results.
Prepared by:
Oxford Radcliffe HOSPITALS
Microbiology and Infectious Disease Departments, John Radcliffe Hospital, Oxford
1999

Antibiotic control

- Cefuroxime restriction

- Meropenem audits & restriction
- 80% used as per policy

- Limited impact in high transmission areas

Antibiotic use

- Treatment guidelines
  - Gentamicin for sick patients
  - Vancomycin if known MRSA
- Prophylaxis
  - Gentamicin for all clean surgery
  - Vancomycin if known MRSA

Admission screening

- MRSA status
  - therapy
  - prophylaxis
  - single room/barrier nursing

Isolation of MRSA positive patients

- hand hygiene
- environmental contamination
- expensive
- risks to patient
- useful in high transmission areas

Admission Screening

- Screening based on risk
  - high risk units - transmission
  - high risk patients - invasion
- 16,000 screens per annum

Admission screening

- Low risk areas
  - no admission screening
- Medium risk areas
  - screen high risk patients
- High risk areas
  - screen all admissions

High risk units

- Screen all admissions
  - Adult ITU
  - Trauma
  - Vascular
  - Neuro ITU

ITU screening project

- Aims
  - to provide data about MRSA activity
    - how many MRSA positive patients are admitted ?
    - how many patients acquire MRSA ?
  - to study to effect of monthly feedback

Definitions

- All patients are screened for MRSA on admission (<48 hours)

- Acquisition
  - not known to be positive previously
  - admission screen negative
  - MRSA positive later in stay

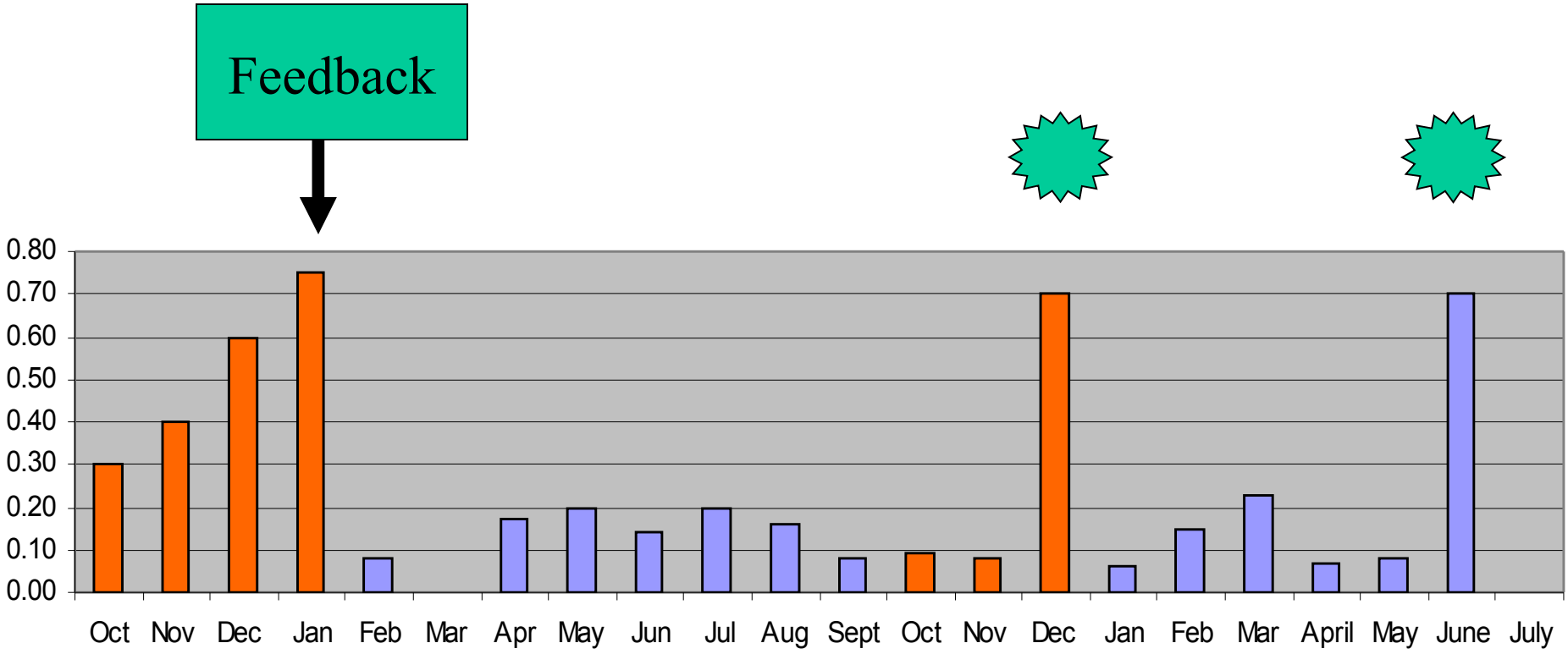
Results 1

- October 2002 → July 2004
  - 22 months
- 1569 admissions
- 1292 screened <48 hours 82%
- 18% not screened

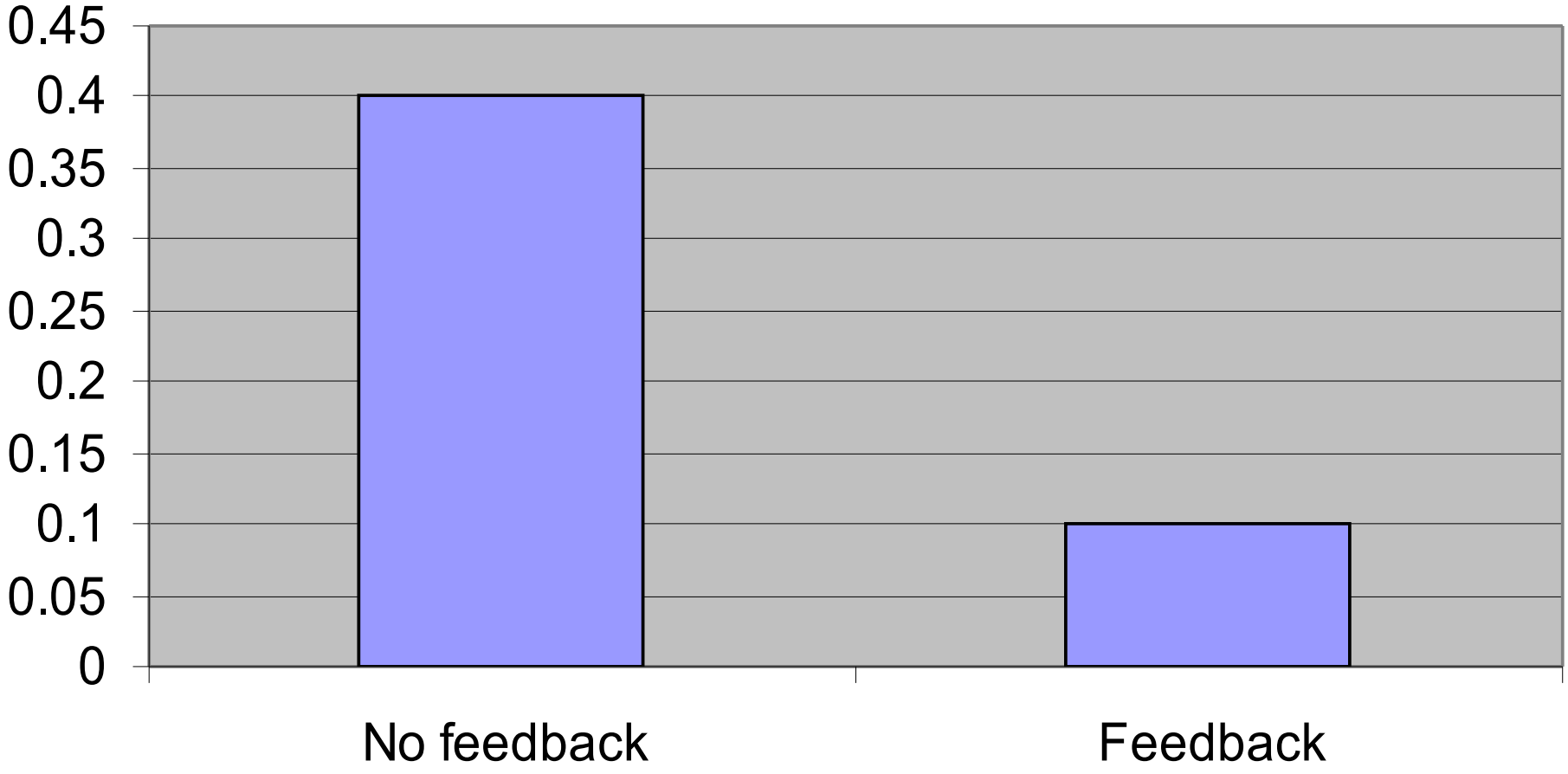
Results 2

- 18 % admitted carry MRSA
- 3.9 % acquire MRSA
- Transmission varied from month to month

Ratio of MRSA acquired per MRSA case admitted to AITU



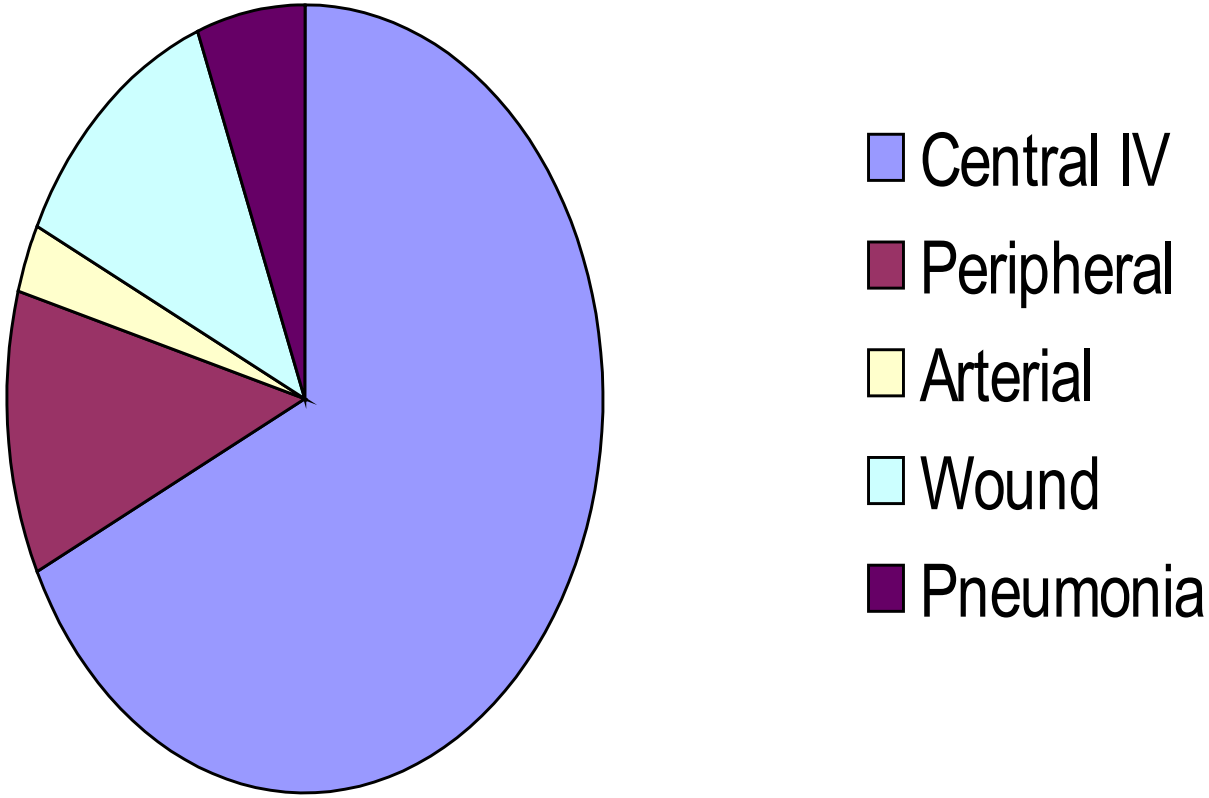
Average Monthly Transmission Ratio



Preventing invasion

- Intravascular line care
  - antimicrobial coated central lines
  - phlebitis due to peripheral lines

34 Hospital Acquired Staph aureus Bacteraemias May/August 2002



ITU Central IV policy audit

- June 1997 - May 1998

- Non coated central IV 5 days

- Betadine aqueous skin prep

ITU Central IV policy audit

- June 1998 - May 1999

- Silver/chlorhexidine central IV 8 days

- Chlorhexidine alcoholic skin prep

ITU Central IV audit

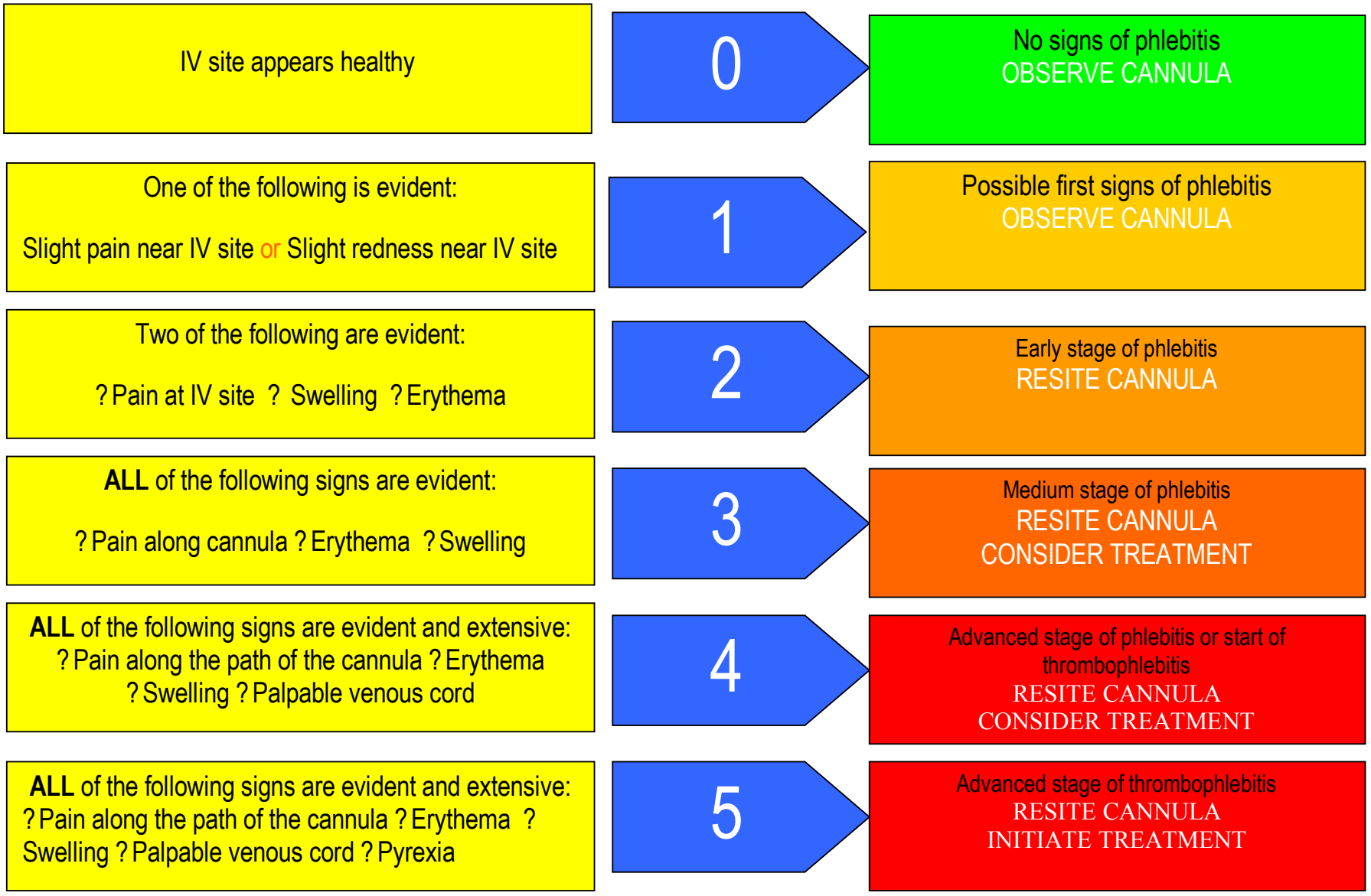
	Non Coated	Silver/Chlorhexidine
Patients	672	652
St aureus +	33	15
Rate/100pts	4.9	2.4

- 2005 coated lines for all ORH patients?

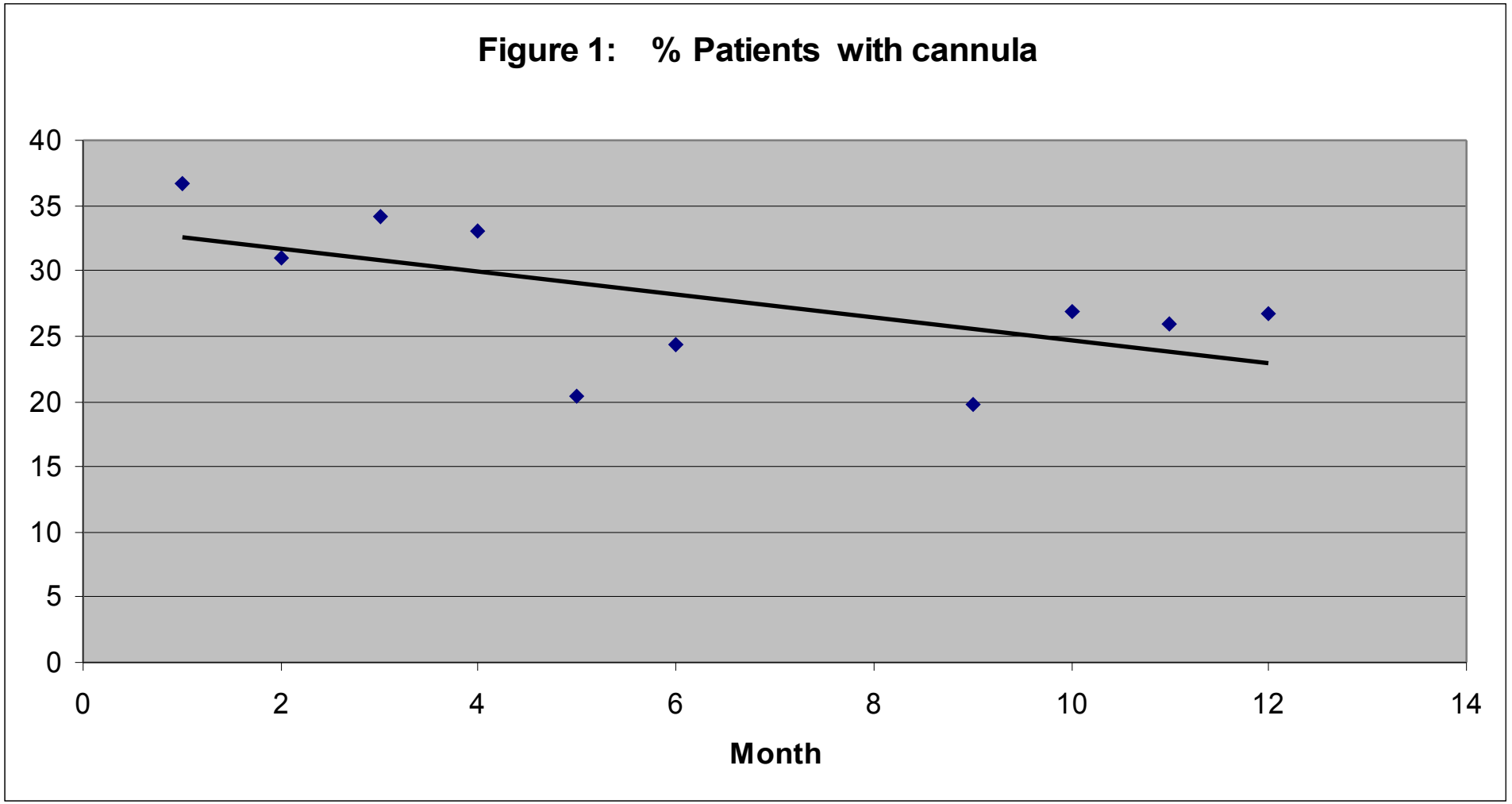
IV awareness Level 7 JR

- Peripheral IV devices
- Monthly prevalence surveys
  - Dressing intact
  - Insertion site visible
  - Device in use
  - Phlebitis - VIP score

VISUAL INFUSION PHLEBITIS SCORE



Level 7 JRH 2000
Feedback of IV audit data



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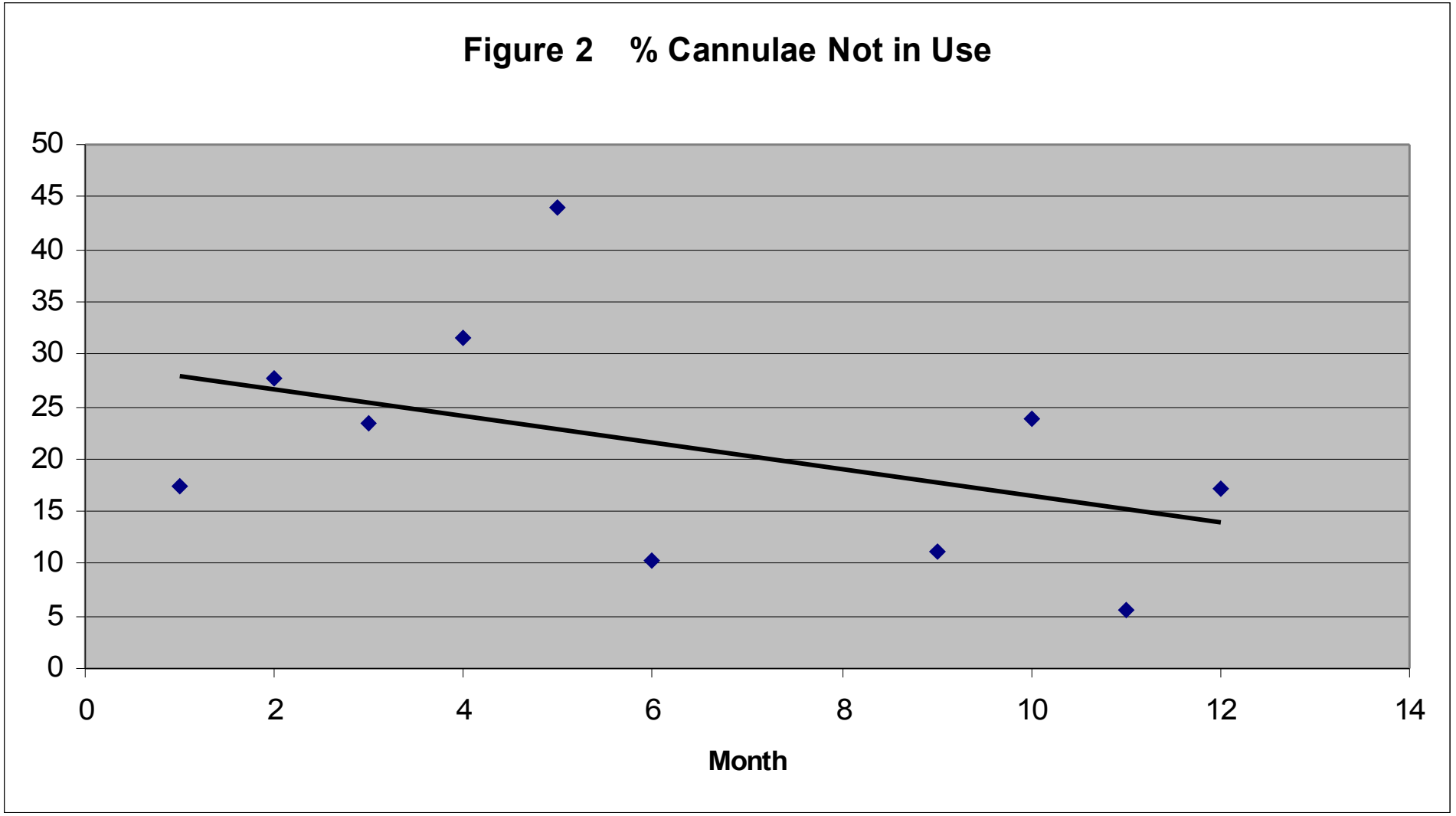
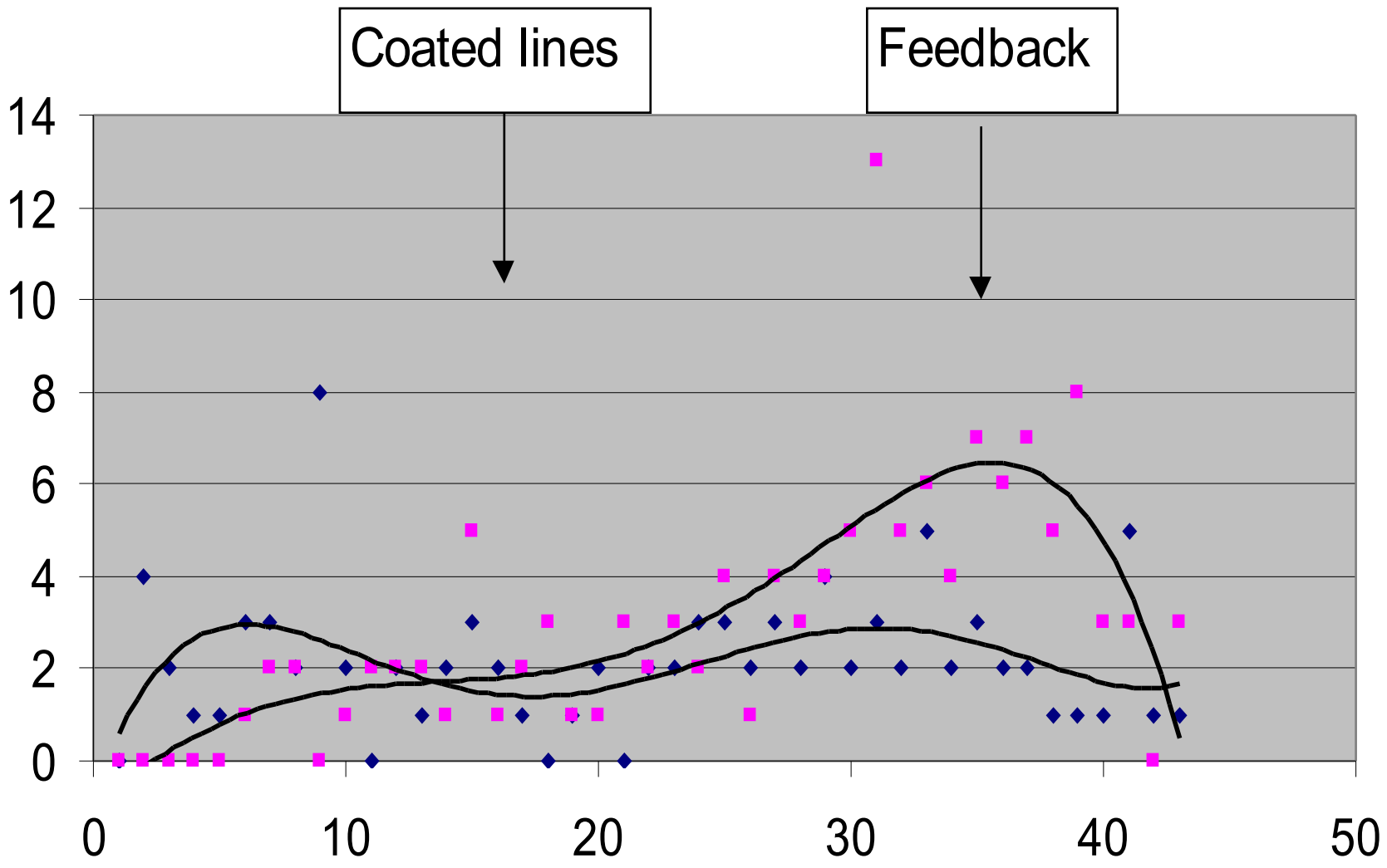


IV Awareness Weeks 2002/3

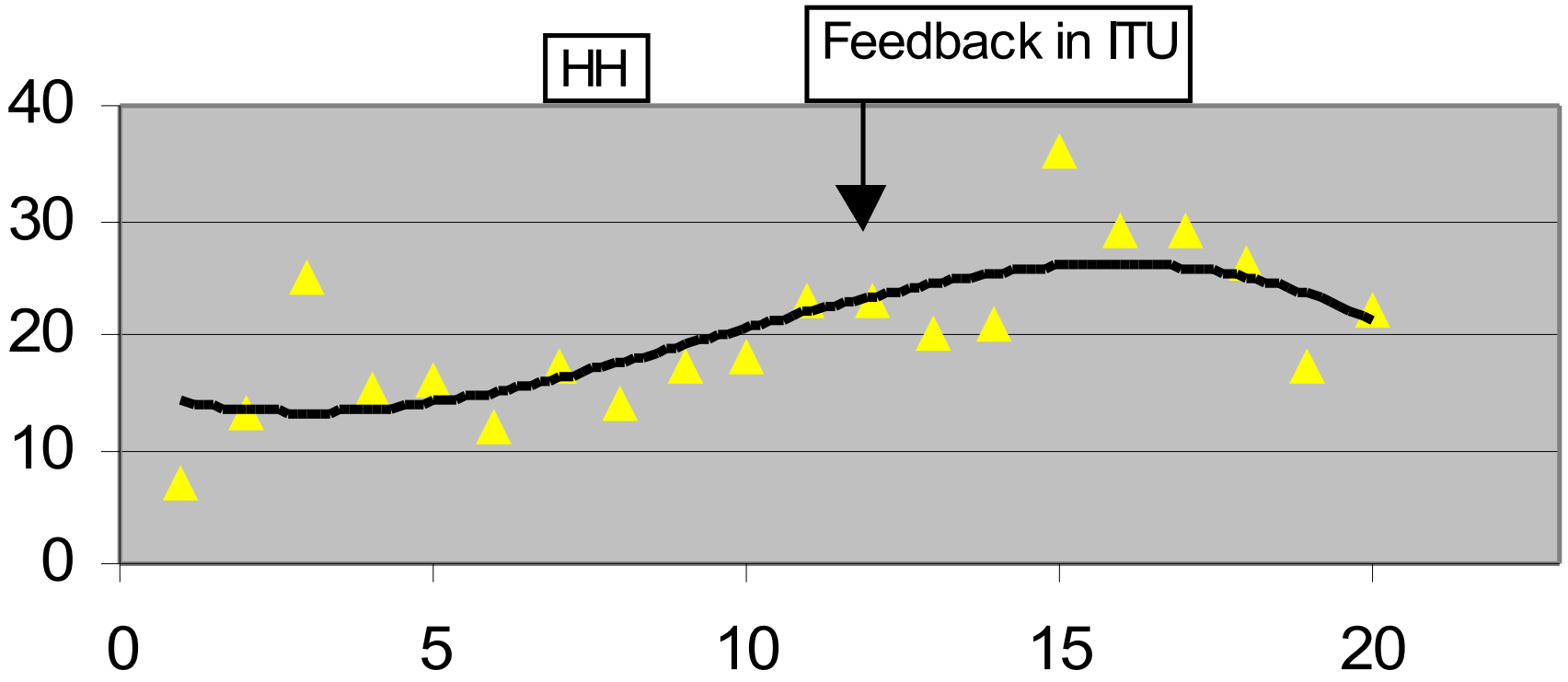
- 43 clinical areas
- 771 patients audited
  - 43% had a peripheral IV
  - 92% intact dressing
  - 87% entry site easy to view
  - 24% not in use for last 24 hours
- 3% had VIP score of 2 or more (phlebitis)

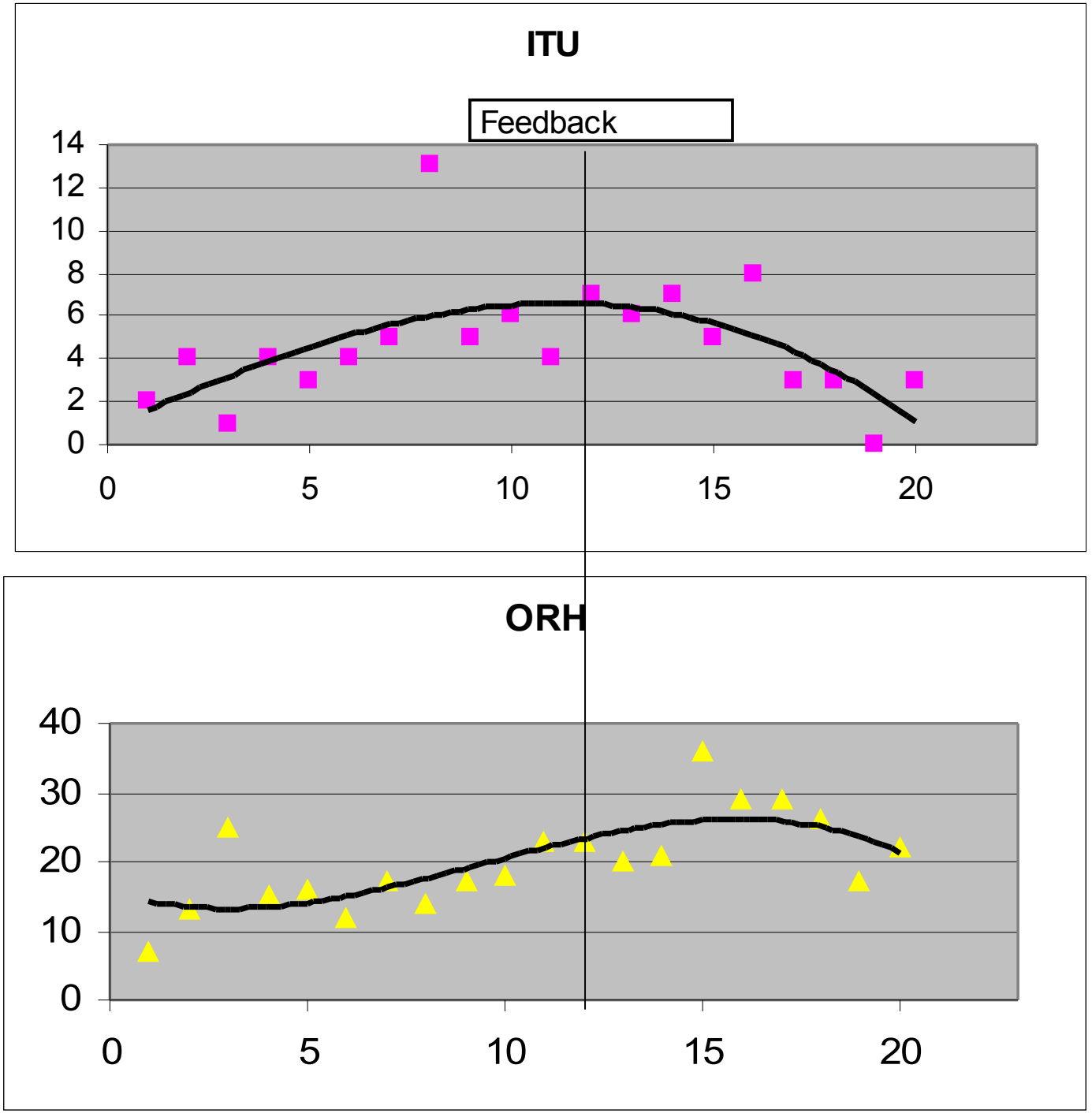
10 patients at risk of Staph aureus bacteraemia

ITU MRSA and MSSA bacteraemia 1994 -2004



ORH MRSA bacteraemia 2000-4




ITU
Feedback
14
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ORH
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20

Targets are good

- Clinicians provide expertise
- Managers are performance managed
- Organisation responds